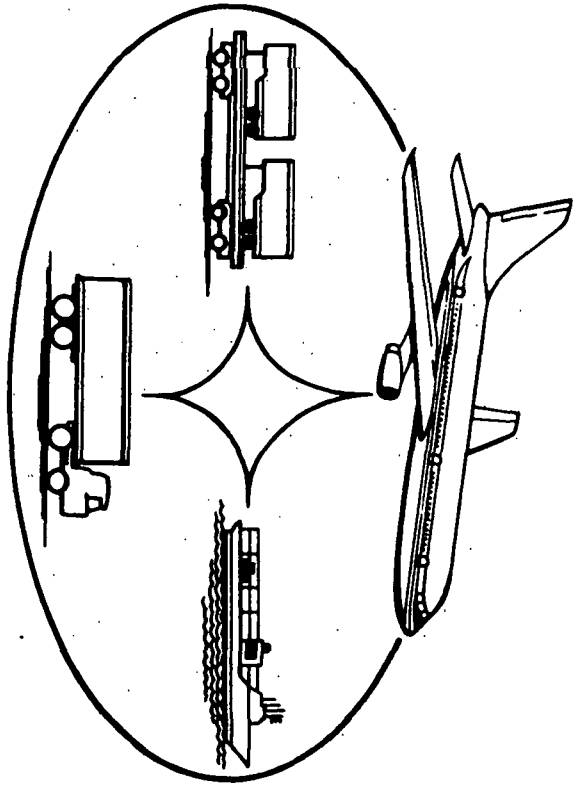

IMPACTS

IMPACT OF THE ACIS

Introduction

It is one thing to use modern technology to develop a system; it is another to ignore the impacts such a system will have on the surrounding physical and cultural environment. The designers of any transportation system must insure that the long-term viability of the environment is preserved.

The human race is constrained by its environment; specifically by such aspects as food, land, water, climatic change, energy, hazardous substances, non-fuel minerals, human stress, social tension, ecological stability, management, and global organization (ref. 1).

Over the years the development of air transportation has resulted in many social and economic impacts. In some of the earlier books on air transportation, predictions were made about changes that would result from increased air transportation. Many of these changes have become such an accepted part of everyday life that they would no longer be regarded as impacts. For example, the following social and economic impacts were predicted in 1951 (ref. 2).

1. Changes in population growth resulting from:
   a. aerial warfare - decrease population
   b. quick transportation of emergency supplies to disaster areas - increase population

2. Redistribution of population resulting from:
   a. development of resources in inland Africa, Asia, and South America
   b. population shifts to meet increased labor needs of the U.S. west coast

3. Expanded markets for products
   a. Aviation enables salesmen and buyers to make more frequent contacts.
   b. California produce will be sold on the east coast.

4. Recreational impacts
   a. Vacations to more distant places will become common.
   b. Areas in which sports contests are held will be widened.

5. Impacts on education
   a. Study of physics of flight as well as biology of organisms in the air will become an important part of textbooks.
   b. Concepts of geography will be transformed through the airplane's ability to enter the spherical air ocean linking all points on the earth's surface.

6. Measurement of distance will be in terms of time.

Since 1970, when the National Environmental Policy Act (NEPA), PL 91-190 became a part of U.S. law, the procedure to determine the impacts of a system or project has been addressed and in most cases better understood than at any previous time. This was due to the creation of a major new responsibility for those concerned with any planning project that may have a significant effect on the environment; they have to produce a detailed statement of the environmental impact of the proposed action.

"Accordingly, agencies and consultants have had to consider a whole new set of factors in project planning, and to do so in a systematic way. In preparing the environmental impact statement, all relevant factors must be identified, the nature and seriousness of the project's impact on them must be assessed, and the data must be so presented as to make informed, rational decision-making as straightforward as possible." (ref. 3)

The obligation to be concerned about the environment, the importance of impact assessment, and the recognition that many of the above factors would be impacted by our designed system were responsible for the development of an impact team to evaluate the possible impacts of the ACIS.

Structure

The team consisted of at least one member of each of the original four teams (Fig. I.1).

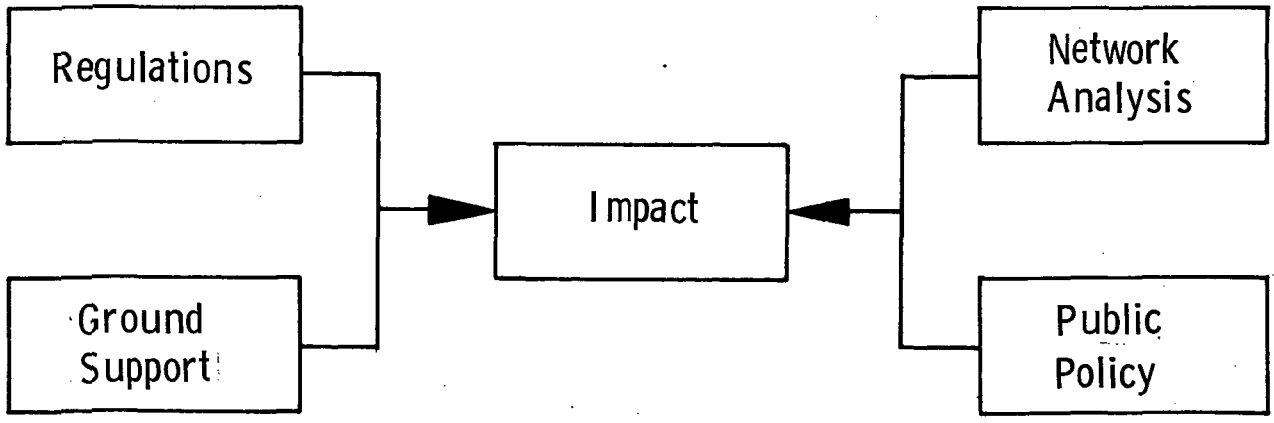

Figure I.1 IMPACT INPUTS

In this way, inputs from all four teams were funneled into a central group for discussion, organization, and evaluation.

A team objective was to identify and, if feasible, explain the interaction of each task group's portion of the ACIS and possible cultural and physical concerns.

Two definitions of the word "impact" were recognized:

(1) Simply stated, "impact" means change -- any change, positive or negative -- from a desirability standpoint

(2) "An impact can be defined as any change in the physical -- chemical, biological, cultural, and/or socioeconomic environmental system that can be attributed to human activities relative to alternatives under study for meeting a project need." (ref. 4)

Methodology

All participants received a memorandum which explained the need to identify impacts of the ACIS. The memorandum included two examples of impact assessment methodology; these examples are shown below (ref. 5).

Planning and Design Phase

1. Impact on land use through speculation in anticipation of development
2. Impact of uncertainty on economic and social attributes of nearby areas
3. Impact on other planning and provision of public services
4. Acquisition and condemnation of property for project, with subsequent dislocation of families and businesses

Construction Phase

1. Displacement of people
2. Noise
3. Soil erosion and disturbance of natural drainage
4. Interference with water table
5. Water pollution
6. Air pollution (including dust and dirt and burning of debris)
7. Destruction of or damage to wildlife habitat
8. Destruction of parks, recreation areas, and historic sites
9. Aesthetic impact of construction activity and destruction of or interference with scenic values
10. Impact of ancillary activities (e.g., disposal of earth, acquisition of gravel and fill)
11. Commitment of resources to construction
12. Safety hazards

Operation of Facility-Direct Impacts

1. Noise
2. Air pollution
3. Water pollution
4. Socioeconomic
5. Aesthetic
6. Effects on animal and plant life (ecology)
7. Demand for energy resources

I. Physical and chemical characteristics
   A. Earth
      1. Mineral resources
      2. Construction material
      3. Soils
      4. Land form
      5. Force fields and background radiation
      6. Unique physical features
   B. Water
      1. Surface
      2. Ocean
      3. Underground
      4. Quality
      5. Temperature
      6. Recharge
      7. Snow, ice, and permafrost
   C. Atmosphere
      1. Quality (gases, particulates)
      2. Climate (micro, macro)
      3. Temperature
   D. Processes
      1. Floods
      2. Erosion
      3. Deposition (sedimentation, precipitation)
      4. Solution
      5. Sorption (ion exchange, complexing)
      6. Compaction and setting
      7. Stability (slides, slumps)
      8. Stress-strain (earthquake)
      9. Air movements

II. Biological conditions
   A. Flora
      1. Trees
      2. Shrubs
      3. Grass
      4. Crops
      5. Microflora
      6. Aquatic plants
      7. Endangered species
      8. Barriers
      9. Corridors
   B. Fauna
      1. Birds
      2. Land animals including reptiles
      3. Fish and shellfish
      4. Benthic organisms
      5. Insects
      6. Microfauna
      7. Endangered species
      8. Barriers
      9. Corridors

III. Cultural factors
  A. Land use
    1. Wilderness and open spaces
    2. Wetlands
    3. Forestry
    4. Grazing
    5. Agriculture
    6. Residential
    7. Commercial
    8. Industrial
    9. Mining and quarrying
  B. Recreation
    1. Hunting
    2. Fishing
    3. Boating
    4. Swimming
    5. Camping and hiking
    6. Picnicking
    7. Resorts
  C. Aesthetics and human interest
    1. Scenic views and vistas
    2. Wilderness qualities
    3. Open space qualities
    4. Landscape design
    5. Unique physical features
    6. Parks and reserves
    7. Monuments
    8. Rare and unique species or ecosystems
    9. Historical or archeological sites and objects
    10. Presence of misfits
  D. Cultural status
    1. Cultural patterns (life-style)
    2. Health and safety
    3. Employment
    4. Population density
  E. Constructed facilities and activities
    1. Structures
    2. Transportation network (movement, access
    3. Utility networks
    4. Waste disposal
    5. Barriers
    6. Corridors
IV. Ecological relationships
  A. Salinization of water resources
  B. Eutrophication
  C. Disease-insect vectors
  D. Food chains
  E. Salinization of surficial material
  F. Brush encroachment
  G. Other

Impact Matrix

Throughout the project, impacts were noted by the participants, both individually and in the task group teams. The impacts were collected by each team's representative to the impact task group. Near the completion of the project, the impact team developed a list of the identified impacts. These were categorized as to type and used to develop an impact matrix. The matrix went beyond just identifying the relationships because it enabled the team to evaluate the significance of the impact via a numerical impact evaluation.

Each cell of the matrix indicated an interaction between a task group/ geographic area and an impact. The importance of an interaction was related to the significance (assessment of the consequences) of the anticipated interaction. The assignment of the numerical value was based on the subjective judgement of the appropriate task group team.

The impacts were divided into two categories: physical and cultural. Thes two categories were further divided into technology, natural resources, and environmental in the physical category and economic, social, and political in the cultural category. Each subcategory was further subdivided into impacts recognized by the summer group.

Impact Matrix Results (See Interaction Matrix, Table I.1)

Following is the final list of impacts and the individual impact intensity caused by the ACIS.

I. Physical
   A. Technology
      1. Maintain U.S.'s aircraft technology lead (High)
      2. Further mechanization skills (Moderate)
      3. Lower storage inventories/quicker response times (Moderate)
   B. Natural Resources
      1. Fuel Consumption
      2. Non-Fuel mineral consumption (Moderate)
      3. Water supply demand (Moderate)
      4. Wildlife displacement (Low)
      5. Land Use (Moderate)
   C. Environmental
      1. Noise (High)
      2. Air (Moderate)
      3. Water (Low)
      4. Solid waste (Low)

II. Cultural
   A. Economic
      1. Improve international trade balance (High)
      2. Airline route system (High)
      3. Ability of aircraft industries to attract capital (Moderate)
      4. Older aircraft obsolescence (Moderate)
      5. Taxpayer cost (subsidies) (Low)
      6. Payroll (Moderate)

7. Increased viability of airline industries (High)
8. Industrial developments close to airports (High)
9. Increased taxes to pay for greater public services (Moderate)
10. Residential values (Low)
11. Income levels change (Low)

B. Social
1. Unemployment-reduce (Moderate)
2. Unemployment-increase (Low)
3. Urbanization (Moderate)
4. Airport road access congestion (Moderate)
5. Organization structure of airlines (Moderate)
6. Organization structure of transportation system (Moderate)
7. Movement of population (Moderate)
8. Increased public service needs (Low)
9. Increased housing needs (Low)

C. Political
1. Area growth (Moderate)
2. Government elected representatives (Low)
3. New electorate boundaries (Low)
4. New labor-social force of carriers and forwarders (Moderate)
5. Regulatory agencies organization (Moderate)
6. Regulation change (Moderate)
7. Population characteristic change (Low)
8. International Markets (High)
9. Increased International Cooperation (Moderate)

The greatest positive interaction occurs in the following specific impacts:

Airline route system (Economic)
Fuel consumption (Natural Resources)
Industrial developments close to airports (Economic)
Improve international trade balance (Economic)
Increased viability of airline industry (Economic)
International Markets (Political)
Maintain U.S.'s aircraft technology lead (Technology)
Noise pollution - hearing loss (Environmental)

Many impacts that are of low or moderate importance could be rated high in local situations or at local areas. Also, the importance of environmental impacts are less than some individuals might suspect. Only noise pollution was of high importance. This is due to ACIS representing only a small portion of the environmental impact of the aircraft industry. This is also why the social impacts were not as important as might be expected.

By totaling the rows and colums, the most important or serious grouped impacts were determined. Table I.1 is a further compilation in order that the overall interaction of the major impact topics and the task group/geography areas can be related.

The network section is dominant in positive effects, both nationally as well as locally. The ground support interaction is strong locally while both

the regulatory and public policy sections show a national interaction with very little direct local involvement.

It becomes evident that the two most important impact sections, based on average interaction per specific impact, are the economic (10.0) and technological (9.6) with natural resources (8.4) third. This ranking indicates a cyclic phenomena problem for the ACIS. Without the financial capacity and the advancement of technology (which needs capital to be accomplished) the ACIS may not be developed. However, it also indicates that by implementing the system, there is a possibility of helping to alleviate the economic and technologic problems which presently face the aircraft industry.

	Regulatory		Network		Ground Support		Public Policy		Local Total	National Total	Total	Average Impact
Economic	4	13	25	17	20	8	7	16	56	54	110	10.0
Social	1	6	11	10	19	4	2	7	33	27	60	6.7
Political	1	11	10	11	8	0	7	15	26	29	55	6.1
Cultural (Subtotal)	6	30	46	38	47	12	16	38	115	110	225	7.7
Technology	-3	5	13	17	6	3	0	7	16	32	48	9.6
Natural Resource	1	1	13	13	11	4	-2	1	23	19	42	8.4
Environmental	6	5	19	13	22	3	-8	-2	39	19	58	4.9
Physical (Subtotal)	4	11	45	43	39	10	-10	6	78	70	148	6.7
Total	10	41	91	81	86	22	6	44	193	180	373	7.4

Local

National

Table I.1 Interaction Matrix

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